WHAT IS CLAIMED IS:

1. A polymer electrolyte membrane comprising a quaternized amine salt on a support matrix.

2. The polymer electrolyte membrane of claim 1, further comprising a fuel cell comprising an anode and a cathode, wherein said fuel cell is a liquid-feed fuel cell and wherein the polymer electrolyte membrane is disposed between the anode and cathode.

3. The polymer electrolyte membrane of claim 2, wherein said fuel cell is a direct methanol fuel cell.

4. The polymer electrolyte membrane of claim 1, wherein the quaternized amine salt is selected from the group consisting of a poly-4-vinylpyridinebisulfate, a poly-4-vinylpyridinebisulfate silica composite, and a combination thereof.

5. The polymer electrolyte membrane of claim 1, wherein the support matrix is selected from the group consisting of a glass fiber matrix, a polybenzoxazole matrix, and a polybenzimidazole matrix.

6. A methanol fuel cell comprising:
an anode;
a cathode;
a proton-conducting membrane comprising a quaternized amine salt on a support matrix; and
a pump element, in fluid communication with the anode.

7. The fuel cell of claim 6, wherein the fuel cell uses methanol.

8. The fuel cell of claim 6, which is a direct methanol fuel cell.

9. The fuel cell of claim 6, wherein the quaternized amine salt is selected from the group consisting of a poly-4-vinylpyridinebisulfate, a poly-4-vinylpyridinebisulfate silica composite, and a combination thereof.

10. The fuel cell of claim 6, wherein the support matrix is selected from the group consisting of a glass fiber matrix, a polybenzoxazole matrix, and a polybenzimidazole matrix.

11. A proton conducting membrane comprising a quaternized polyvinylpyridine polymer or composite.

12. The proton conducting membrane of claim 11, wherein the composite comprises a nanoparticulate oxide.

13. The proton conducting membrane of claim 12, wherein the composite is a poly-4-vinylpyridine bisulfate silica.

14. The proton conducting membrane of claim 11, wherein the quaternized polyvinylpyridine is poly-4-vinylpyridine bisulfate.

15. A method of forming a proton conducting membrane comprising

dissolving poly-4-vinylpyridine in a solvent to form a mixture;

contacting the mixture with sulfuric acid or phosphoric acid to obtain a precipitate;

recovering the precipitate;

mixing the precipitate with an aqueous solvent to form a paste; and

applying the paste to a support matrix.

16. The method of claim 15, wherein the solvent is methanol.

17. The method of claim 15, wherein the precipitate is a poly-4-vinylpyridine bisulfate.

18. The method of claim 15, wherein the aqueous solvent is water.

19. The method of claim 15, wherein the support matrix is sleeted from the group consisting of a glass fiber matrix, a polybenzoxazole matrix, and a polybenzimidazole matrix.

20. The method of claim 15, further comprising adding nanoparticle silica to the mixture prior to adding the acid.

21. The method of claim 20, wherein the precipitate is a poly-4-vinylpyridine bisulfate silica.

22. The method of claim 20, wherein the silica is rich in surface hydroxyl groups.